

CONVERGENCE OF COLORATION BETWEEN  
AMERICAN PILOSE FLIES AND  
BUMBLEBEES (*BOMBUS*).

E. GABRITSCHIEVSKY,

RESEARCH FELLOW OF THE INTERNATIONAL EDUCATION BOARD,  
COLUMBIA UNIVERSITY, NEW YORK.

THE EUROPEAN AND ASIATIC GROUP OF *Volucella Bombylans*.

In a previous paper, in which the heredity of color variations in the European fly *Volucella Bombylans* has been described, an attempt has been made to show the striking resemblance in coloration between various flies of the families *Syrphidæ*, *Asilidæ*, *Tabanidæ*, *Æstridæ* and *Bombylidæ* with various bumblebee species which inhabit the same geographical regions.

The study of those analogous color patterns which appear both amongst flies and bumblebees is interesting from a genetic point of view and bears on the problem of mimicry in animals.

The black *V. Bombylans* (Pl. I., Figs. 1, ♂, ♀; 2, ♀; 3, ♀) with its fulvous bands on the last abdominal segments has exactly the same coloration as the common European *Bombus lapidarius*, *B. confusus*, *B. rajellus*, *B. mastrucatus*, etc. The other variety, *V. hæmoroidalis* (Pl. I., Figs. 4, 5), is almost indistinguishable from many other *Bombus* species, as for example *B. agrorum*, *B. vorticosus*. The third variety of the *V. Bombylans*, the *V. B.* var. *plumata* (Pl. I., Figs. 6, ♂, ♀; 7, ♀) with its characteristic white hairs on the last abdominal rings, is extremely like *B. hortorum*, *B. lucorum*. *Volucella bombylans* (and its varieties), if really protected by her mimetic coloration, may be supposed to creep unobserved into a *Bombus* nest to lay her eggs there on the wax-combs. More often however the fly puts her eggs on the grass and moss, which covers the *Bombus* nest. This of course can only be performed with a *Bombus* species which builds its nest on the ground, not under the ground. In localities where many *Bombus* colonies of this kind are present the *Volucella* flies are also found in large quantities. The larvæ of *Volucella* feed on wax,

pollen and decayed or injured *Bombus* larvæ (fresh larvæ are never attacked).

The "Mimicry" of *Volucella* offers a fascinating field for research and one of the steps which must be taken in the preliminary study of this case is to find out how close a resemblance there is between a variety of *Volucella* and the various species of *Bombus* in the same geographical area. Such a resemblance has been described in my previous paper for the European group of *Volucella*. I was interested therefore to see if this was true for the American varieties of *Volucella*.

Before dealing with this question I wish to refer to some new details on the coloration of the European *Volucella Bombylans* which must be also taken into consideration in the study of the North American group. Many flies of these species have been collected recently in the central parts of Russia, to see if there are any other variations than those which have been generally described. Specimens of *V. Bombylans* have been found with an entirely rufous abdomen (Pl. I., 2, ♀), which corresponds exactly to the color of the abdomen of the northern *B. laponicus* and other allied species. This variety has been collected in Russia only twice in a region where the *B. laponicus* does not occur. Another variety of *V. Bombylans*, which may be named *V. Bombylans* var. *flava*, is not uncommon. This fly has a spot of yellow hairs on the thorax (Pl. I., Fig. 3, ♀), but the rest of the fly is typical *Bombylans*. (Only females of this type have been collected.) The yellow spot of hairs of this black variety is located in the same place as the black spot of yellow varieties of male *V. hæmorrhoidalis* and male *V. plumata*. It is significant from a genetic point of view that in the European *Volucella* group of flies only this little area of thoracic hairs is limited to one sex, whereas the entire body coloration is otherwise alike in both sexes. Thus the yellow spot of the black variety seems to appear only in the females, the black spot of the yellow varieties on the contrary is limited to the males (*V. plumata* and *V. hæmorrhoidalis*). It is, however, possible to find in some localities also females of *V. plumata* and *V. hæmorrhoidalis* which have a very reduced black thoracic spot of hairs. The black spot itself has often a brown color in the females, but never in the males. The *V. altaica* from Asia is extremely

dimorphic in regard to this black spot. The male (Pl. I., Fig. 9) has a perfectly black thorax, the female has the usual black spot in relation to its size and coloration like the males of *V. hæmorrhoidalis* (Pl. I., Fig. 4) and *V. plumata* (Pl. I., Figs. 6, 7). The yellow spot of *V. Bombylans* var. *flava* is inherited. I had in one culture (unpublished data) 6 females in  $\mp_1$  of *V. Bombylans* var. *flava* from a female *V. Bombylans* var. *flava* (Pl. I., Fig. 8).

The *V. Bombylans* var. *caucasica*, which lives in bumblebee nests of the Caucasian mountains, has a white thorax (the black spot is present in the males), and the upper part of the abdomen is also white, but the third to sixth abdominal rings are exactly the same as in the European *V. Bombylans* and *V. hæmorrhoidalis* (compare Figs. 1, 2, 3, 4, 8, Pl. I.).

On looking at this fly one gets the impression that only the yellow hairs of the European variety *V. plumata* and *V. hæmorrhoidalis* have changed into white, but that the black and fulvous hair covering the end of the abdomen remained unaffected. A parallel color change occurs in almost all black bumblebee species which inhabit the Caucasus. The *Volucella Caucasica* is thus similar to the Caucasian *B. eriophorus*, *B. niveatus* and other species of this region, which have white patches of hair on the thorax. The black and rufous parts of the bumblebees' abdominal rings, which correspond to the black and rufous bands of the endemic *Volucella* flies remained also unaffected and similar in coloration to those of the European *Bombus lapidarius*, *B. confusus* and *Volucella Bombylans* (type). Many other Caucasian flies (*Cheilisia æstracea*, *Tabanus gudaurensis*, *T. tricolor*, etc.) have similar color changes parallel to those described above. The appearance of white spots or bands is characteristic for both bumblebees and flies of this mountain region.

Summarizing these data we can say that there is a striking phenomenon of color convergence between European *Syrphidæ* (especially *Volucella*, and its varieties), *Tabanidæ*, *Asilidæ* and *Æstridæ* and bumblebees, which are distributed in the same geographical area. A similar parallelism in coloration can be also noticed for the Caucasian region. It must be also pointed out that there is a predominance of certain color patterns for the European group of bumblebee-like flies and bumblebees. The

combination of black and rufous, white and yellow, and black and white stripes is more often found than black and yellow. This is a characteristic feature of both insect genera in the European part of the old world.

An entirely different situation is found in the United States of America. Even a superficial survey of the collections of American (Syrphidæ and Asilidæ) flies and bumblebees shows distinctly, that both insect genera have, strictly speaking, only one pattern, namely, black and yellow striped individuals. (Only two species, *B. occidentalis* and *B. borealis*, have parts of their body covered with white hairs.) The combination of black and rufous, yellow and white, black and white, is absolutely absent or very rare on this continent. The overwhelming numbers of black and yellow striped specimens among these flies and bumblebees is a peculiar feature throughout the United States. The phenomenon of color convergence has reached its climax in North America.

#### THE NORTH AMERICAN GROUP OF *Volucella Bombylans*.

The systematic relationship of the American varieties of *V. Bombylans* has been recently studied by Johnson ('16, '25) who divides these flies into two large groups. To the first (the black-faced group) belongs the eastern *V. evecta*, var. *V. evecta americana* var. *V. evecta sanguinea*, and the boreal *V. evecta arctica*. To the second (the yellow-faced group) belongs the western *V. facialis*, the Canadian *V. facialis lateralis* and the *Vol. facialis* var. *rufomaculata*, which is found in Colorado and along the Rocky Mountains. Excepting the coloration of the pleura, which may be yellow or black in both groups, and excepting differences in the color patterns of the thorax and abdomen, no other distinguishing characters have been detected. It is very probable that all European and American varieties might interbreed.

#### CONVERGENCE OF COLORATION BETWEEN FLIES OF THE EASTERN STATES AND BUMBLEBEES OF THE SAME REGION.

##### *Volucella bombylans* var. *evecta-americana*

(Pl. I., 15).

The eastern *Volucella bombylans* var. *evecta* (Pl. I., 15) *americana* is entirely pale yellow except the last two to four posterior abdom-

inal segments, which are covered with black hairs. The same distribution of yellow and black hairs on the thorax and abdomen is characteristic for all the eastern species of pilose flies. *Mallota posticata* (Pl. I., 18, 19), *Mallota cimbiciformis* (Pl. I., 20-22), *Eristalis flavipes* (Pl. I., 23-24), *Eristalis bastardii* (Pl. I., 26-27), *Dasyllis lata* (Pl. II., 9), *Dasyllis marquarti* (Pl. II., 9), *Das. sacraton* (Pl. II., 9), *Das. champlaini* (Pl. II., 8). All these *Syrphidæ* and *Asilidæ* are very common in the eastern states and can be found on the same flowers with *Bombus*.

Six bumblebee species of the eastern states, namely *Bombus vagans* (Pl. III., 1), *B. affinis* (Pl. III., 7), *B. impatiens* (Pl. III., 3), *B. separatus* (Pl. III., 2), *B. bimaculatus* (Pl. III., 5), *B. perplexus* (Pl. IV., 4) have a coloration exactly corresponding to *Volucella evecta americana* (Pl. I., 15) and to the other *Syrphidæ* and *Asilidæ* which are mentioned above. (Compare Pl. I., 15, with Pl. III., 1, 7, 3, 2, 5, 4. Compare also Pl. II., 7, 8, 9, with Pl. III., 1, 7, 3, 2, 5, 4 and then Pl. II., 10, 11, with Pl. III., 13, 14, 15.)

Four other eastern bumblebee species, namely *B. pennsylvanicus* (Pl. IV., 13, 14), *B. auricomus* (Pl. IV., 13, 14), *B. terricola* (Pl. IV., 14) have a slightly different distribution of black and yellow hairs on the thorax and abdomen. This group of bees has its corresponding group of flies. It is hardly possible to detect any difference between the eastern *Eristalis flavipes* (Pl. I., 24) var. *b.*, *Dasyllis dithoracica* (Pl. II., 10, 11), *Das. grossa* (Pl. II., 11) and the bumblebees enumerated above. The flies are generally like the females, workers and males of the corresponding bumblebee species, but this is only true when the Hymenoptera has no polymorphic females or males. *B. bimaculatus* (Pl. III., 5) of this first eastern group, which is like *V. evecta americana*, has a male variety colored like *Eristalis flavipes* var. *b* (Pl. I., 24), *Eristalis flavipes*, on the other hand, has just been compared with the bumblebees of the second eastern group. (The groups are divided here only in relation to their color patterns.) We find the same phenomenon in *B. affinis* (Pl. III., 7), and *B. pennsylvanicus*, both of which have three types of males; (Pl. IV., 10, 11, 15-18) one of these is like the female, but the two others are entirely different. The latter two are extremely like *Criorhina verbosa* (Pl. II., 14) and *Criorhina Kinkaidi* var. *b* (Pl. II., 16).

As a rule, it is possible to maintain that most of the bumblebees' males are like the *Criorhina* flies. This is due to the fact that the males, like these flies, have reduced black bands which make them almost indistinguishable.

From the above we might infer that there is a very close resemblance between bumblebees and flies of the eastern parts of the United States. Yet it would be a mistake to conclude from this that there is mimicry between both genera; it must not be forgotten that there is also the same convergence in coloration, even as regards details, within the group of bumblebees and also within the group of flies or, more exactly, there is not only a correspondence between the flies and bumblebees of a given district, but the several species of Hymenoptera found living in a region resemble one another closely, and species of flies are also much alike among themselves. For example, when the bumblebees are compared with one another, we see that the coloration of the variety of *B. auricomus* (Pl. III., 13, 14), with the yellow scutellum, reappears in the same pattern in *B. pennsylvanicus* (Pl. III., 13, 14). One of the males of *B. bimaculatus* (Pl. III., 9), is similar in this respect to one of the males of *B. affinis* (Pl. III., 11). Many other coincidences are also evident and not uncommon in these groups. (Compare figures.) The coloration of the European *B. lapidarius* reappears in *B. confusus*, in many other species and in *Volucella Bombylans* (type) (Pl. I., 1).

The distribution of *V. b. evecta americana* is probably by far more restricted than that of the above mentioned bumblebees, which may be found further to the south. This can be explained through the fact that all large *Volucella* are circumboreal species and never appear farther to the south than the 42d parallel, unless there are mountains which extend to the south. Favorable conditions are thus produced and the bumblebee nests may be found again infested with *Volucella* larvæ in more elevated zones. *Volucella evecta americana* is not to be found much farther to the north. According to Johnson this variety can be collected along the Atlantic coast as far north as Mount Desert, but there this fly is already replaced by *Volucella bombylans facialis lateralis* (Pl. I., 11), which belongs to the Canadian zone.

*Volucella bombylans evecta* (Walker) (Pl. I., 14).

The thorax, scutellum and the three first abdominal rings of this fly correspond to *V. B. evecta americana*, (Pl. I., 15), but the posterior 4-6 segments may be either yellow or reddish. *Evecta* is the upper austral form, extending through the transition zone. This fly resembles closely the males of the eastern bumblebees. Its coloration has altogether the aspect of these Hymenoptera, but a strict parallelism in color patterns with any of the eastern bumblebees is not traceable. *Volucella evecta* is a rare form when compared with *V. evecta americana*. It is possible that a detailed study of its distribution in the east might explain its color patterns.

*Volucella bombylans evecta sanguinea* (Pl. I., 16).

This variety is an extremely rare variation of *V. B. evecta americana*. It has been recorded in the eastern states. This fly has yellow hairs on thorax, scutellum and abdomen, except the third abdominal ring, which is covered with fulvous pile. The sides of this segment have some black hairs. This *Volucella* represents, in a way, a parallel variation to that of *V. rufomaculata* in the subspecies *facialis*, which is distributed along the more elevated portions of the Rocky Mountains. *V. sanguinea* is not comparable to any bumblebee species of the eastern United States. A third and analogous parallel variation is found in *Eristalis flavipes* var. *melanostoma* (Pl. I., 25) of the east, and a fourth in *Dasyllis fernaldi* (Pl. II., 18) an Asilid fly of the Rocky Mountains.

The sporadic reappearance of parallel variations in *V. sanguinea* and *Eristalis flavipes*, which are analogous to the variety of *V. rufomaculata* and *Dasyllis fernaldi* (Pl. II., 18) of the west, suggests that the genic mutations producing these color changes in some individuals are probably of a related chemical structure, in the sense of their end effect. It is also interesting that they affect the same parts of the insect's body. The same argument can be applied to the bumblebees. It would be more difficult to explain, however, the way in which a new mutation could replace the more abundant form for a given geographical zone.

CONVERGENCE OF COLORATION BETWEEN FLIES  
OF THE ARCTIC ZONE.

*Volucella bombylans arctica* (Pl. I., 17). This syrphid of the *evecta* group is entirely dark yellow, with a short and unfinished black band on the thorax. This *Volucella* is extremely like in coloration to the arctic bumblebee—*Bombus gelidus* (Pl. IV., 1), and *B. borealis* (not figured).

CONVERGENCE OF COLORATION BETWEEN FLIES OF THE ROCKY  
MOUNTAINS AND BUMBLEBEES OF THIS REGION.

*The Volucella facialis Group, Volucella Bombylans facialis var. rufomaculata* (Pl. I., 13).

*Volucella rufomaculata*, which is a parallel variation to the *V. evecta sanguinea* of the *evecta* group is limited to the mountain region of Colorado, Utah and New Mexico. The dorsum of the thorax is black pilose-like in all varieties of the *facialis* group. This is a characteristic which is entirely absent in the *evecta* group (compare Pl. II., 14-17). In this respect the male and female flies of the *evecta* group are like the females of the European varieties of *Volucella Bombylans*, and the male and female flies of the *facialis* group can be compared to the males of the European varieties of *Volucella plumata* and *hæmorrhoidalis*. The pleura of the *facialis* flies are black as in the European varieties. It is not improbable that the western American *Volucella* group is more closely related to the European group.

It is again striking that *V. rufomaculata* has a coloration resembling that of most of the bumblebees of this mountain region. An exact coincidence in color patterns can be observed in *Bombus sylvicola* (Pl. IV., 5), *B. huntii* (Pl. IV., 1-2), *B. melanopygus* (Pl. IV., 4), *B. eduardii* (Pl. IV., 13-17), *B. ternarius* (Pl. IV., 6). The same is true for the Asilid fly *Dasyllis fernaldi* (Pl. II., 18).

Five other bumblebee species of the Colorado area, namely, *Bombus centralis* (Pl. IV., 18), *B. borealis* (Pl. IV., 12), *B. gelidus* (Pl. IV., 1), *B. flavifrons* (Pl. IV., 7, 8), *B. rufocinctus* (Pl. IV., 9), *B. kirbuellus* (not figured), *B. appositus* (Pl. IV., 12) have also the same type of coloration with the characteristic rufous abdominal segment like that of *V. rufomaculata*. The coincidence in



coloration of the segments is not so exact as in the first four bumblebee species enumerated above, but the reappearance of some segments with red pile must be regarded as a characteristic feature in both insect genera of this region. It is strange that the Caucasian mountain species of flies and bees are partly changing their pile into a shining white color, whereas the American mountain species tend to turn into a bright vermilion coloration.

Another group, consisting of bumblebees with a shining wax yellow coloration is also present in the Colorado region. This includes *B. sonorus* (Pl. IV., 3), *B. morissoni* (Pl. IV., 4), *B. nevadensis* (Pl. IV., 5), *B. terricola* (Pl. III., 14). As regards the distribution of black and yellow bands, the first three species are like the first group of the eastern bumblebees, and the fourth one is like the bumblebees of the second eastern group. The main difference is observed in the tint of the yellow pile, which is extremely bright in *B. morissoni*, *nevadensis*, *sonorus* and *terricola*. It is apparently again a case of color convergence, but which is present only in the hymenoptera group, as no flies of this kind have been collected in this mountain zone. Occasionally it is possible to find *Volucella* flies with the more brilliant wax yellow pile, but it must be pointed out that the yellow hairs of the flies vary in intensity of pattern from light ochre to swarthy brown, or more exactly from maize yellow through wax yellow to deep colonial buff. Many slight variations can also be noticed in the red pile. The black color on the contrary is always constant. Many Asilidæ are like these bumblebees; an exact distribution of the same colored bands can be observed in *Dasyllis lata* var. *a. D. champlaini*, *D. macquarti*, *D. grossa* ♀ (Pl. II., 7, 8, 9, 12). *Mallota posticata* (Pl. I., 19).

CONVERGENCE OF COLORATION BETWEEN FLIES OF THE PACIFIC  
COAST AND THE *Bombus* SPECIES WHICH INHABIT  
THE SAME REGION.

*The Volucella bombylans facialis* (Pl. I., 12).

This fly is one of the darkest when compared with the other pilose species of this family. The pleura are black pilose; the dorsum of the thorax has a larger area covered with black hairs than in all other *Volucella* flies. The black hairs of the third

abdominal segment extend also partly onto the second ring, and sometimes on to the upper quarter of the fourth abdominal ring. The last segments are yellow pilose or reddish. An increase of black hairs on thorax, scutellum and abdomen is also characteristic for the endemic bumblebees. *Bombus vosnesensky* (Pl. IV., 6), *B. Crotskii* (Pl. IV., 7), *B. californicus* (Pl. IV., 8-11) are good examples of this. *Volucella facialis* is distributed along the Pacific coast and in Alaska. The coincidence in the distribution of black and yellow bands in *Volucella* flies and bumblebees of this zone is not absolutely exact, but yet the increase of the black hairs and the distinct and parallel process of melanization in both insect genera is strikingly evident.

*Volucella B. facialis lateralis* (Pl. I., 11).

This fly is extremely like the former one, but the pleura are yellow pilose, and the black spot on the dorsum of the thorax has a more reduced area than in *V. facialis*. *V. lateralis* belongs to the Canadian zone (Alaska to Newfoundland, Mt. Desert) and is, so to speak, the eastern representative of *facialis*. I have no data as to other flies and bumblebees of this large area, and a comparison has thus been impossible.

SUMMARY.

1. The European Syrphid fly *Volucella Bombylans* and its varieties, *V. hæmoroidalis* and *V. plumata* have a coloration which corresponds to the coloration of the majority of European bumblebees. The same is true of many other pilose flies of Europe.

2. The Caucasian *Volucella bombylans caucasica* has a coloration which corresponds to the coloration of various bumblebees of this mountain region. The same is true for other pilose flies of this zone.

3. The American *Volucella bombylans evecta-americana* of the eastern states and 8 other species of Syrphid flies have exactly the same color patterns as six different *Bombus* species of this region; four different *Bombus* of the same area have the same type of coloration as three other beelike flies of the eastern states.

4. *Volucella bombylans evecta sanguinea*, and *Eristalis flavipes* var. *melanostoma* of the eastern states are rare and parallel

variations which have analogous coloration to that of *Volucella bomb.* var. *rufomaculata* of the *facialis* group and of the Rocky Mountain region.

5. *Volucella bombylans arctica* of the *evecta* group is similar in coloration to the arctic bumblebee *Bombus gelidus* and to other species.

6. *Volucella bombylans* var. *rufomaculata* of the Rocky mountains has a similar coloration to twelve different bumblebee species which occur in the same region. The Asilid fly *Dasyllis fernaldi* of the same zone has a corresponding coloration to *V. rufomaculata* and to the twelve bumblebee species.

7. *Volucella bomb. facialis* of the Pacific coast has analogous color patterns to three bumblebee species of this zone. *Volucella bomb. facialis lateralis* of the Canadian zone and *V. bomb. evecta* of the eastern states have not been studied on account of absence of data as to their distribution.

I am greatly indebted to Dr. A. Sturtevant, Dr. Johnson and Dr. Lutz, for the use of their collections of flies and of *Bombus*, also for their help and advice in this work.

#### LITERATURE.

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#### EXPLANATION OF PLATES I-IV.

All figures represent flies in a schematized way. The upper square is the thorax; the second one is the scutellum; the third is the abdomen. The dotted line between the abdomens of different flies shows the segments of the insects. The head is not drawn. In Plate I. the black color corresponds to the black pile, the white to white hairs, the spotted parts are of a yellow coloration, and the vertical parallel lines correspond to a cadmium orange tint in the flies. In all the other plates, (I. (11-27) and III., IV.) the uncolored parts of the schemes correspond to different tints of yellow (the exact color stands in the explanation of the plates; these colors have been compared with Ridgway's Color Standards—R. Ridgway, "Color

Standards and Color Nomenclature," 1912, Washington). The black parts are again black in the flies and bumblebees; the striped individuals have on those segments a cadmium orange coloration. The exact shades of these different red tints are given under every figure in the explanation of the plate.

EXPLANATION OF PLATE I (NOS. 1-10).

*The European and Asiatic Groups of Volucella Bombylans.*

1. *Volucella Bombylans*, ♂, ♀.
2. *Volucella Bombylans*, var. *rufa* ♀.
3. *Volucella Bombylans*, var. *flava*. ♀.
4. *Volucella B. hæmoroidalis* ♂, and *Volucella B. altaica* ♀.
5. *Volucella B. hæmoroidalis* ♀.
6. *Volucella B. plumata* ♂.
7. *Volucella B. plumata* ♀.
8. *Volucella caucasica* ♂.
9. *Volucella altaica* ♂.
10. *Volucella plumata* var. *a* ♀.

The yellow pile is variable. Specimens of these flies are found with a maize yellow (19-40, *y. f.*, Pl. IV.), wax yellow (21, 0-yy Pl. XVI.), and deep colonial buff yellow (21, 0, Pl. XXX.). The red pile is less variable, yet specimens with a cadmium orange (13, 0-0, Pl. III.), or Mars yellow (15-00, Pl. III.), or ochraceous tawny (15-00, Pl. XV.) are found.

The white pile is snow white, or with a slight yellow tint.

EXPLANATION OF PLATE I. (NOS. 11-27).

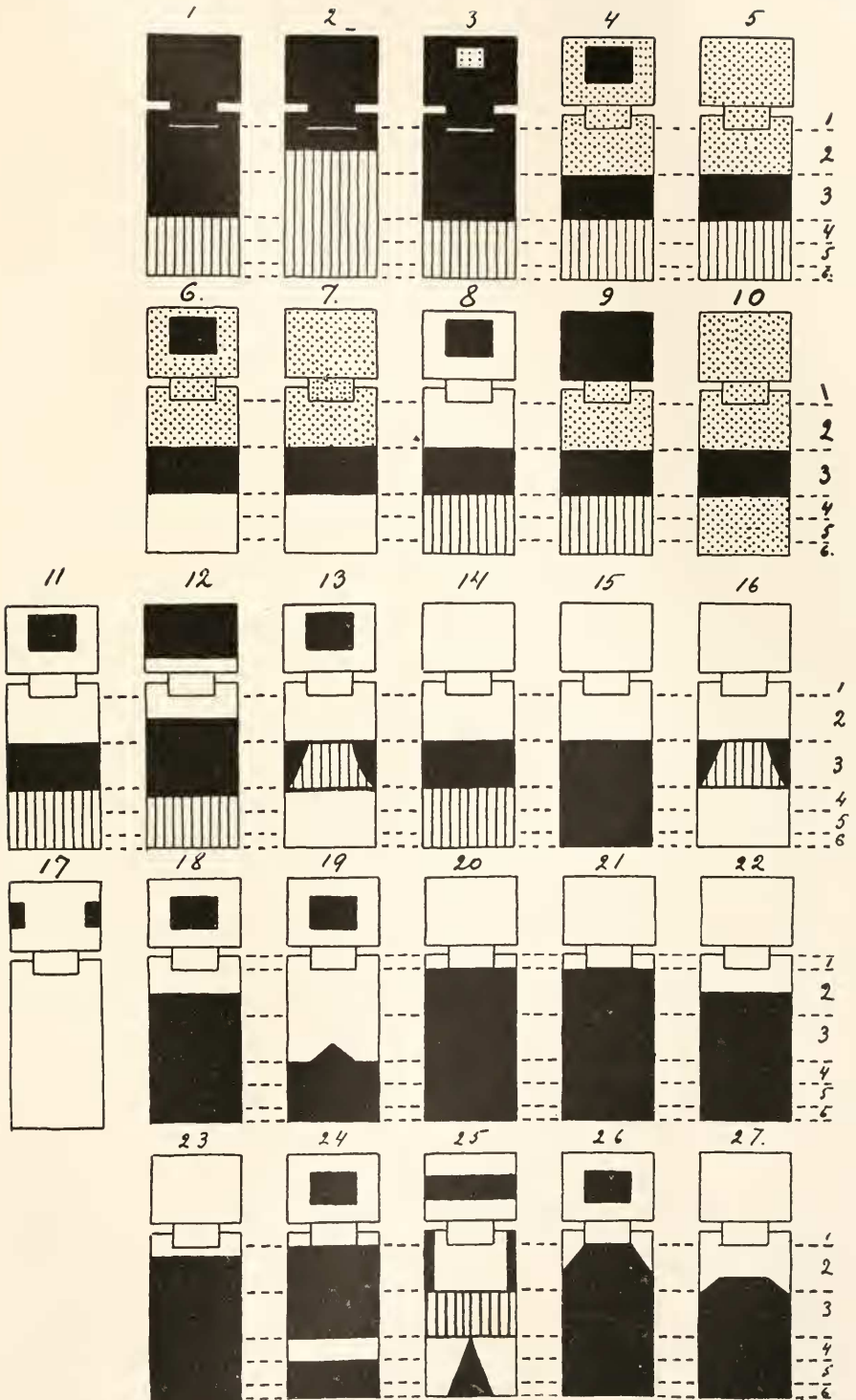
*The North American Group of Volucella bombylans.*

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|---|--|---|---|---|---------------------------------------|
| <ol style="list-style-type: none"> <li>11. <i>Volucella bombylans facialis lateralis</i>, ♂, ♀.</li> <li>12. <i>V. B. facialis</i>, ♂, ♀.</li> <li>13. <i>V. B. facialis</i> var. <i>rufomaculata</i>, ♂, ♀.</li> <li>14. <i>V. B. evecta</i>, ♂, ♀.</li> <li>15. <i>V. B. evecta-americana</i>, ♂, ♀.</li> <li>16. <i>V. B. evecta</i> var. <i>sanguinea</i>, ♀.</li> <li>17. <i>V. B. evecta artica</i>, ♂, ♀.</li> </ol> | <table style="border: none;"> <tr> <td style="font-size: 3em; vertical-align: middle;">}</td> <td style="vertical-align: middle;">The <i>facialis</i> group—maize yellow.</td> </tr> <tr> <td style="font-size: 3em; vertical-align: middle;">}</td> <td style="vertical-align: middle;">The <i>evecta</i> group—maize yellow.</td> </tr> </table> | } | The <i>facialis</i> group—maize yellow. | } | The <i>evecta</i> group—maize yellow. |
| }   | The <i>facialis</i> group—maize yellow.  |   |   |   |                                       |
| }   | The <i>evecta</i> group—maize yellow.  |   |   |   |                                       |

*The North American Bumblebee-like Syphidæ 11-27.*

The yellow pile is maize yellow (19-40, *y. f.*, Pl. IV.), the red pile is cadmium orange (130-0 Pl. III.).

- |  |   |   |                             |   |            |   |                  |   |                             |   |               |
|--|---|---|-----------------------------|---|------------|---|------------------|---|-----------------------------|---|---------------|
| <ol style="list-style-type: none"> <li>18. <i>Mallota posticata</i>, ♂, ♀.</li> <li>19. <i>Mallota posticata</i> var. <i>a</i>, ♂, ♀.</li> <li>20. <i>M. cimbiciformis</i> var. <i>a</i>, ♂, ♀.</li> <li>21. <i>M. cimbiciformis</i> var. <i>b</i>, ♂, ♀.</li> <li>22. <i>M. cimbiciformis</i> var. <i>c</i>, ♂, ♀.</li> <li>23. <i>Eristalis flavipes</i> var. <i>a</i>, ♂, ♀.</li> <li>24. <i>Er. flavipes</i> var. <i>b</i>, ♂, ♀.</li> <li>25. <i>Er. flavipes</i> var. <i>melanostoma</i>, ♀.</li> <li>26. <i>Er. bastardii</i>, ♀.</li> <li>27. <i>Er. bastardii</i>, ♂, ♀.</li> </ol> | <table style="border: none;"> <tr> <td style="font-size: 3em; vertical-align: middle;">}</td> <td style="vertical-align: middle;">Wax yellow or maize yellow.</td> </tr> <tr> <td style="font-size: 3em; vertical-align: middle;">}</td> <td style="vertical-align: middle;">Gray pile.</td> </tr> <tr> <td style="font-size: 3em; vertical-align: middle;">}</td> <td style="vertical-align: middle;">Wax yellow pile.</td> </tr> <tr> <td style="font-size: 3em; vertical-align: middle;">}</td> <td style="vertical-align: middle;">Wax yellow or maize yellow.</td> </tr> <tr> <td style="font-size: 3em; vertical-align: middle;">}</td> <td style="vertical-align: middle;">Maize yellow.</td> </tr> </table> | } | Wax yellow or maize yellow. | } | Gray pile. | } | Wax yellow pile. | } | Wax yellow or maize yellow. | } | Maize yellow. |
| }  | Wax yellow or maize yellow.   |   |                             |   |            |   |                  |   |                             |   |               |
| }  | Gray pile.  |   |                             |   |            |   |                  |   |                             |   |               |
| }  | Wax yellow pile.  |   |                             |   |            |   |                  |   |                             |   |               |
| }  | Wax yellow or maize yellow.   |   |                             |   |            |   |                  |   |                             |   |               |
| }  | Maize yellow.   |   |                             |   |            |   |                  |   |                             |   |               |





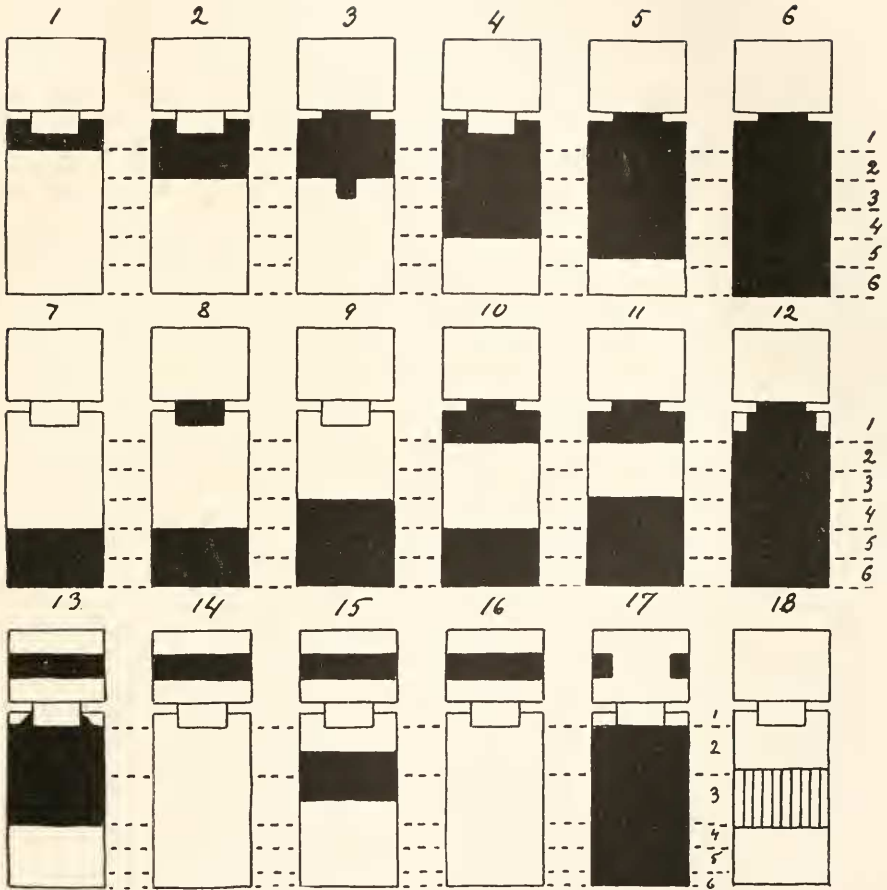


## EXPLANATION OF PLATE II.

*The North American Bumblebee-like Asilidæ, and Flies of the Criorhina Group.*

1. *Dasylyus unicolor*, ♂, ♀.
  2. *Dasylyus insignis*, ♂, ♀.
  3. *D. posticata*, ♂, ♀.
  4. *D. divisor*, *D. cinerea*, ♂, ♀.
  5. *D. sp. ?*, ♂, ♀.
  6. *D. flavicola*, ♂, ♀; *D. virginica*, ♂, ♀; *D. grossa*, ♂, ♀.
  7. *D. lata* var. *a*, ♂, ♀.
  8. *D. champlaini*, ♂, ♀.
  9. *D. lata* var. *b*, ♂, ♀; *D. marquarti*, ♂, ♀; *D. sacraton*, ♂, ♀.
  10. *D. dilhoracica*, var. *a*, ♂, ♀.
  11. *D. dilhoracica* var. *b*, ♂, ♀; *D. grossa*, ♀.
  12. *D. grossa* var. *a*, ♀.
  13. *Criorhina nigripes*, ♂, ♀.
  14. *Criorhina verbosa*, ♂, ♀.
  15. *Criorhina kincaidi* var. *a*, ♂, ♀.
  16. *Criorhina kincaidi* var. *b*, ♂, ♀.
  17. *Cephenomya abdominalis*, ♂, ♀.
  18. *Dasylyus fernaldi*, ♂, ♀.
- } Wax yellow  
 of deep colonial buff.  
 }  
 }  
 } Deep colonial buff.  
 }  
 } Cadmium orange, maize yellow.





E. GABRITSHEVSKY.

